

January 14, 2002

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**WORKPLAN – FURTHER
GROUNDWATER INVESTIGATION**

1450 Fruitvale Avenue
Oakland, California

AEI Project No. 4627

Prepared For

Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94501

Prepared By

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AEI

January 14, 2002

Mr. Barney Chan
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94501

Re: Workplan – Further Groundwater Investigation
1450 Fruitvale Avenue
Oakland, California
AEI Project # 4627

Dear Mr. Chan:

The following workplan has been prepared on behalf of the Fruitvale-Farnam Associates (FFA) and outlines an additional groundwater investigation and presents an exposure pathway evaluation for the above referenced property. AEI Consultants (AEI) has been retained by FFA to provide environmental engineering and consulting services associated with the release of gasoline fuel hydrocarbons at the property. This workplan has been prepared in response to a request by the Alameda County Health Care Services Agency (ACHCSA) dated September 17, 2001.

SITE DESCRIPTION AND BACKGROUND

The subject property (hereinafter referred to as the “site” or “property”) is located on the eastern corner of Fruitvale Avenue and Farnam Street in a residential and commercial area of the City of Oakland. The property is approximately 11,000 square feet in size and is developed with a three-story building that occupies two-thirds of the parcel. The western corner of the parcel is improved with an asphalt parking lot. The property is currently vacant.

The site had reportedly been developed as a gas station in 1950 by Atlantic Richfield Oil Company (currently known as ARCO) and operated until at least 1983. There were four underground storage tanks located along the southern property boundary. The fuel dispenser island was located on the northeast corner of the current parking lot. The gas station was demolished and the existing warehouse was constructed after 1983.

Two soil-boring projects were performed between 1998 and 1999 to determine whether a fuel release had occurred and to what extent soil or groundwater had been impacted. Refer to Figure 2 and Tables 3 & 4 for the locations and results of these soil-boring projects. Three groundwater monitoring wells were then installed. Refer to Figure 3 for the locations of the existing wells and to Tables 1, 2, and 5 for data obtained from the wells. Concentrations of TPH as gasoline and

benzene have been found in the soil up to 360 mg/kg and 0.59 mg/kg respectively. Based on soil analytical data from the borings and the lack of hydrocarbons detected in sidewall samples from an exploratory excavation dug in the former tank location, **the release appears to have occurred along the product piping or in the former dispenser location.** The most recent groundwater analytical data indicates that groundwater has been impacted with TPH as gasoline and benzene up to 30,000 µg/l and 1,900 µg/l, respectively.

GEOLOGIC CONDITIONS

According to logs of the borings completed by AEI, the near surface sediments generally consist of silty clays to approximately 10 to 12 feet below ground surface (bgs). The clays are underlain by sandy and clayey gravels. The water bearing deposits consist of gravel materials. During the advancement of temporary borings, the apparent depth to groundwater, as evidenced by wet or saturated deposits, ranged from 12 to 21 feet bgs. However static groundwater has been measured in the developed wells ranging from 8 to 18 feet bgs. It should be noted that groundwater sample collection during both phases of direct-push sampling that groundwater was difficult to sample and was could not be collected from a majority of the borings.

The site is located at 42 feet above mean sea level (msl). The site is flat; however, the topography of the area slopes gently to the southwest. Average groundwater elevations for the three wells ranged from 25.36 feet above msl in October 2000 to 33.27 feet above msl in April 2001. Based on these measurements, groundwater beneath the site generally flows in a southeasterly direction. With the exception of the first monitoring episode, the average hydraulic gradient is approximately 0.033 ft/ft. Historical groundwater level measurements are present in Table 1.

According to the USGS Oakland East topographic map, the nearest surface water body is the Brooklyn Basin Tidal Canal, located approximately 3,500 feet southwest of the site. Two small surface creeks, Sausal Creek and Peralta Creek, are shown on the map, flowing to the southwest, generally toward the site, however these creeks are shown to terminate approximately ½ mile north of the site.

SCOPE OF WORK

Previous sample analytical results indicate that groundwater has been significantly impacted, with the down-gradient extent of the plume not currently defined. In addition, soil sample analytical data, in conjunction with static groundwater level measurements, indicate that a limited amount of source material remains the unsaturated zone. **The proposed scope of work includes additional plume definition and research of potential exposure pathways to be presented in a conceptual site model.**

Off-site Plume Definition

Three (3) additional monitoring wells (labeled MW-4 through MW-6) are proposed in the locations shown on Figure 4. The well locations were chosen to step away from the known source area. It should be noted that many utilities are present beneath both Fruitvale Avenue and Farnam Street, therefore the final locations of the off-site wells may be adjusted. A summary of the proposed wells is presented in the following exhibit.

Exhibit: Proposed Monitoring Wells

Well #	Purpose	Depth (ft)	Screen Interval (feet bgs)
MW-4	Assess the easterly extent of hydrocarbon plume	23	8-23
MW-5	Assess the southeasterly extent of plume	23	8-23
MW-6	Assess the westerly (up-gradient) plume extent	23	8-23

Soil samples will be collected at approximately 5-foot intervals during drilling of the borings. The samples will be used to classify the soils and for possible chemical analysis. One or two soil sample from each of the borings will be selected for chemical analysis.

The wells will be constructed of 2" flush threaded PVC well casing with 15' feet of factory slotted screen placed from 8 – 23 feet bgs.

The newly installed monitoring wells will be developed no sooner than three days after setting the grout seal. A surge block will be used to loosen any accumulated fines, following which, a minimum of 10 well volumes of water will be removed from each well.

The tops of the casings of the three new monitoring wells will be surveyed by a California licensed land survey, relative to each other, the existing wells, and to mean sea level. Water levels in the wells will be used to calculate horizontal flow gradients.

Exposure Pathway Analyses

AEI will further research potential human exposure pathways for hydrocarbon impacted soil and groundwater associated with the release. Of particular concern is off-site groundwater use and therefore possible human ingestion or inhalation of contaminants. The pathway analyses will include a review of DWR well reports and subsurface utility conduits. Preliminary review of well reports does not indicate any nearby production wells; a formal presentation of well reports review will be presented with the well installation report. Utility locations will be marked as part of the utility clearance for drilling and their locations will be noted.

On-going Monitoring

The resulting network of six monitoring wells will be monitored and sampled on a quarterly basis (approximately every 3 months) for a minimum of one year. Quarterly reports will be issued following each episode of monitoring.

REPORTING

Following receipt of all analytical and survey data, a technical report will be prepared. The report will include figures, data tables, logs of borings, and interpretations of data. In addition, as graphical conceptual site model will be presented along with a summary of potentially complete and incomplete exposure pathways. The exposure pathway analyses will include the results of a well search completed with the Department of Water Resources.

Although a formal risk assessment will not be performed during this project, an approximation can be made as to whether a formal risk assessment is necessary or whether the case can be considered low risk. Assuming that the dissolved plume is shown to be limited and no complete exposure pathways are present, groundwater monitoring without active remediation will be recommended.

FIELD PROCEDURES

Drilling and well construction

Permits for the installation of the wells will be obtained from the Alameda County Public Works Agency. In addition, encroachment permits will be obtained from the City of Oakland for the installation of wells in the public right-of-way. Underground Service Alert North will be notified to mark utility locations in the public right-of-way.

The wells will be installed with a CME 55 or CME 75 or similar rotary drill running continuous flight hollow stem augers. The selected drilling contractor will hold a California C57 driller's license. Augers and down-hole sample collection equipment will be cleaned between samples and borings.

The proposed wells will be constructed of 2" diameter flush threaded Schedule 40 PVC casing. The well casing will be inserted through the augers to a point a few inches above the borehole terminus where it will be suspended until the well is secured within the sand pack.

Sand will be poured through the augers in one- to two-foot lifts to two feet above the top of the screened casing. Sand size will be selected based on observed soil conditions to ensure proper development and recharge of well. Well screen slot size will correspond to selected sand size. Two feet of bentonite pellets will be placed above the sand pack and activated with tap water, to seal against the grout material. The seal will be finished up to the surface with cement grout. A

locking top cap and a flush-mounted, traffic rated, watertight well cover will be installed on each well.

Soil sample collection

Soil samples will be collected in brass liners. The sample liners will be placed in a California modified split spoon sampler, and driven ahead of the auger tip into undisturbed soil with successive hammer blows. All soil samples will be screened with a portable organic vapor meter (OVM) with a 10.6 eV lamp for purposes of sample selection for analysis and worker safety. The sample liners will be sealed with teflon tape and plastic end caps.

Groundwater Monitoring and Sample Collection

The well boxes and locking caps will be opened and water levels in the wells will be allowed to equilibrate prior to the measurement of groundwater elevations. Following measurement of water elevation with an electric water level meter, each monitoring well will be purged with a submersible purge pump. A minimum of three well volumes will be purged from each well prior to sample collection. Water will be monitored for the following parameters: temperature, pH, specific conductivity, and dissolved oxygen (DO). Once the wells have recharged to a minimum of 90% of their original volume, samples will then be collected in disposable Teflon bailers.

Sample Storage

Soil and groundwater samples will be sealed in appropriate containers and labeled immediately upon collection. Samples will be placed in a cooler with water ice, maintained at a temperature of 3 to 4 degrees C. Chain of custody documentation will be prepared prior to leaving the site. All samples will be delivered to the selected laboratory on the day of collection.

Sample Analyses

The selected soil samples will be analyzed for TPH as gasoline (EPA method 8015M) and for BTEX with MTBE (EPA method 602/8020).

The six (6) groundwater samples collected from each of the monitoring wells will be analyzed for TPH as gasoline (EPA method 8015M) and for BTEX with MTBE (EPA method 602/8020) during each episode. For the first episode of monitoring of the six wells, two groundwater sample will be re-analyzed for the five fuel oxygenates (including MTBE) by EPA method 8260B. After the first episode, these additional analyses may be reduced or eliminated, based on initial test results.

Waste Storage

Drill cuttings will be stored on-site in 55-gallon drums, pending the results of sample analyses. On-site treatment or off-site disposal of cuttings is not included in this scope of work. Equipment rinse water and purged well water will be stored in 55-gallon drums. It is likely that

a licensed waste hauler will be contracted to remove the soil and water, under appropriate waste manifest.

SITE SAFETY

Prior to commencement of field activities, a site safety meeting will be held at a designated command post near the working area. Emergency procedures will be outlined at this meeting, including an explanation of the hazards of the known or suspected chemicals of interest. All site personnel will be in Level D personal protection equipment, which is the anticipated maximum amount of protection needed. A working area will be established with barricades and warning tape to delineate the zone where hard hats and steel-toed shoes must be worn, and where unauthorized personnel will not be allowed. A site safety plan conforming to Part 1910.120 (i) (2) of 29 CFR will be on site at all times during the project.

ESTIMATED SCHEDULE


Within one week of written approval of a contractual agreement with AEI, appropriate city and county permitting will begin.


The field-work will be scheduled once permitting is complete. Initial laboratory results will be available approximately one week after well installation work. The wells will be developed no sooner than 3 days after installing the grout seals. Monitoring of the newly installed wells will be coordinated with the established monitoring schedule of the existing wells, or within two weeks of well development, whichever occurs sooner. Quarterly monitoring, sample collection, and reporting will continue on a quarterly basis (every three months), until otherwise directed.

The ACHCSA will be notified of any delays. The ACHCSA will be given a minimum of 1 week notice of the drilling and sampling schedule. AEI anticipates the entire project will be completed in approximately 5 to 10 weeks, from the beginning of permitting through the first episode of monitoring the new wells. A technical report will be submitted once AEI has received all laboratory reports and survey data. Quarterly reports will be issued within one month of sampling activities.

AEI requests your approval to proceed with this project. Please contact either of the undersigned at (925) 283-6000 if you have any questions or need any additional information.

Sincerely,
AEI Consultants


Peter McIntyre
Project Geologist


Joseph P. Derhake, PE
Principal



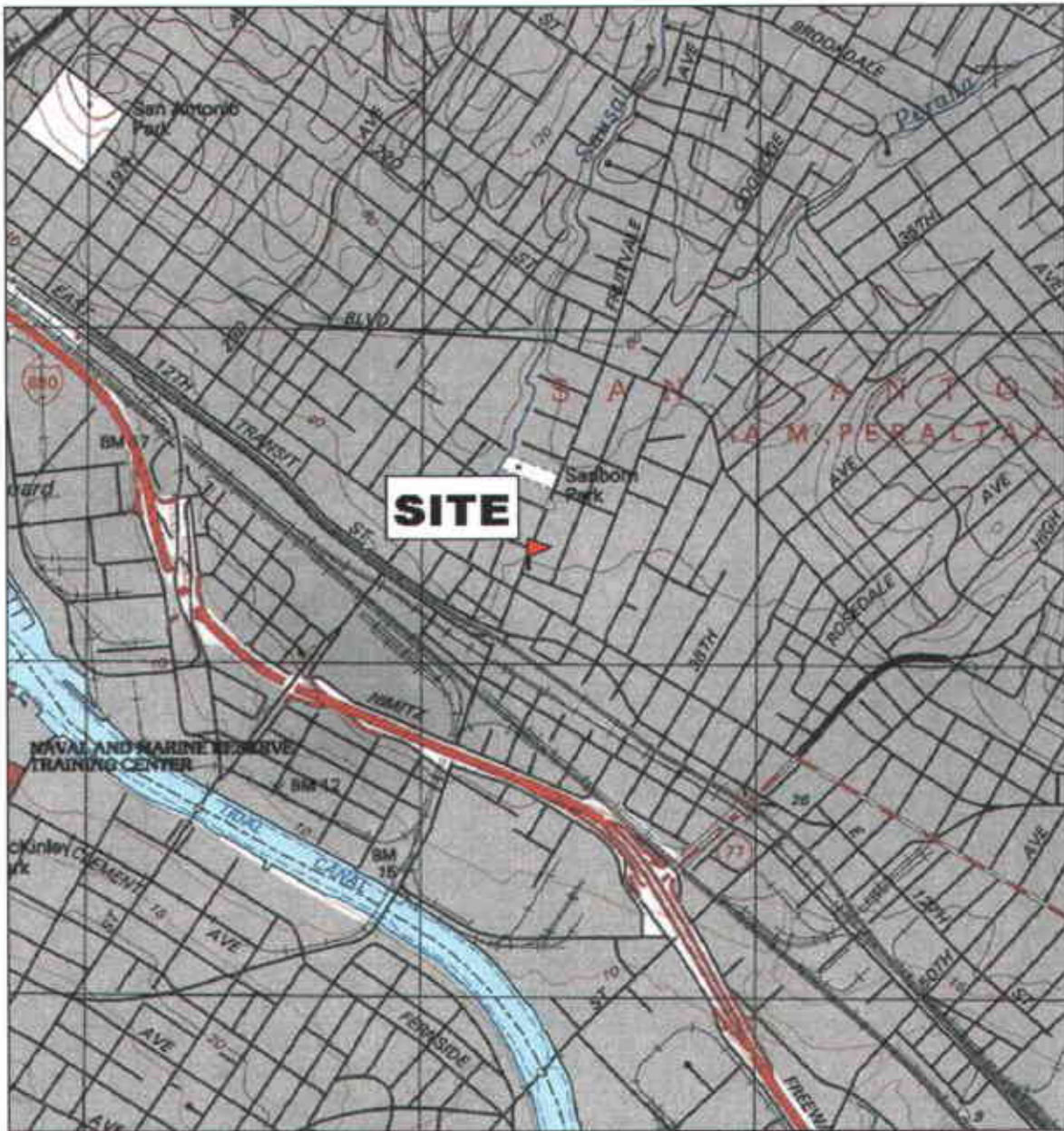
- Figure 1 – Site location map
- Figure 2 – Previous Soil Boring Locations
- Figure 3 – Existing Well Locations
- Figure 4 – Proposed Well Locations

- Table 1 – Water Table Data
- Table 2 – Groundwater Sample Analytical Data
- Table 3 – Previous Soil Sample Analytical Results
- Table 4 – Previous Groundwater Sample Analytical Results
- Table 5 – Previous Well Installation Soil Analytical Data

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AEI CONSULTANTS 3210 OLD TUNNEL RD. STE B. LAFAYETTE, CA	
SITE LOCATION MAP	
1450 FRUITVALE AVENUE OAKLAND, CALIFORNIA	FIGURE 1 PROJECT No. 4627

FRUITVALE AVENUE

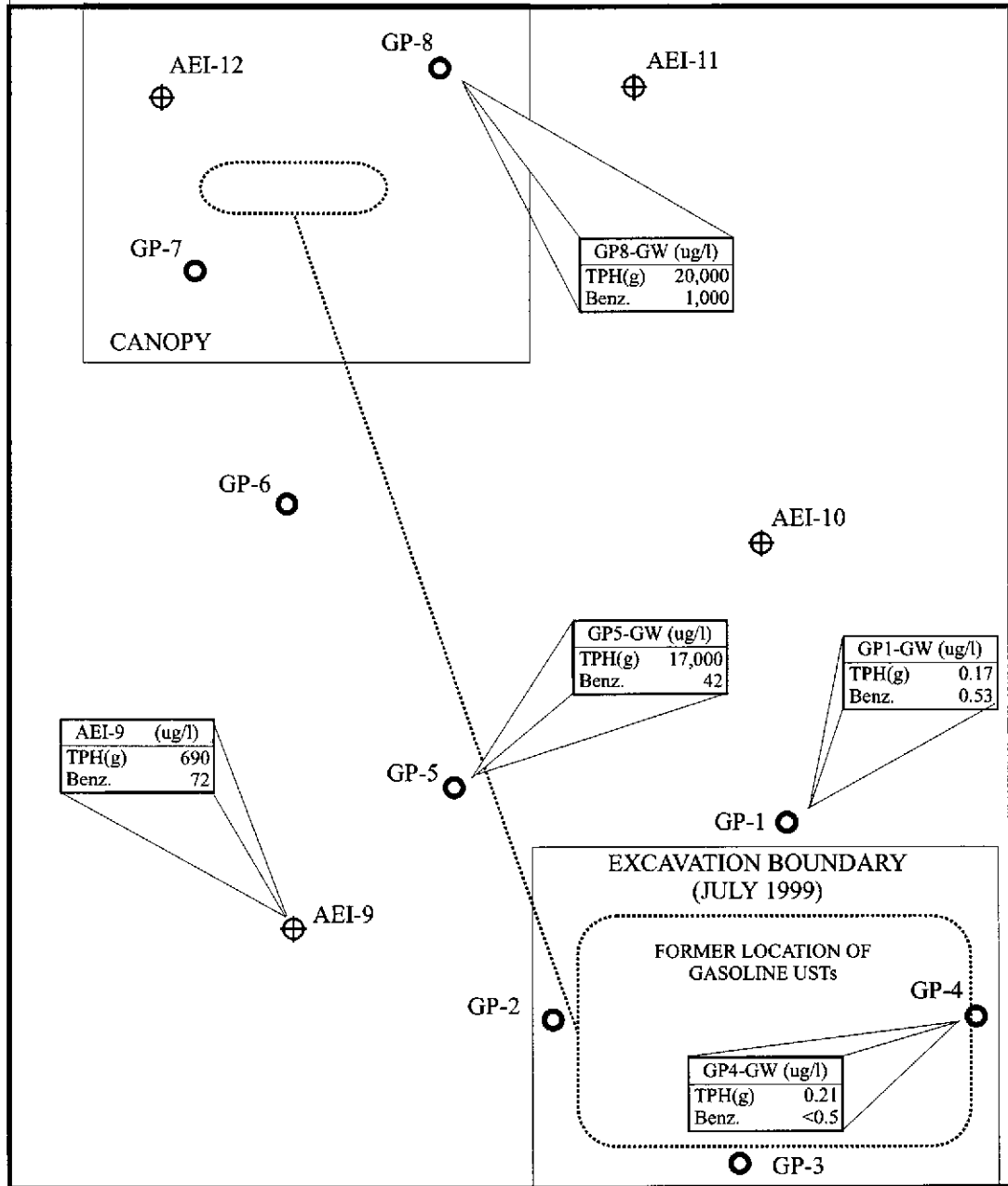
SIDEWALK

BUILDING

BUILDING

SIDEWALK

FARNAM STREET



KEY

⊕ BORING LOCATIONS PERFORMED BY AEI AUGUST 24, 1999

○ APPROXIMATE LOCATIONS OF SAMPLING PERFORMED BY GLENFOS; JULY, 1998

TPH(G) = Total Petroleum Hydrocarbons as gasoline

Benz. = Benzene

SCALE: 1" = 10'

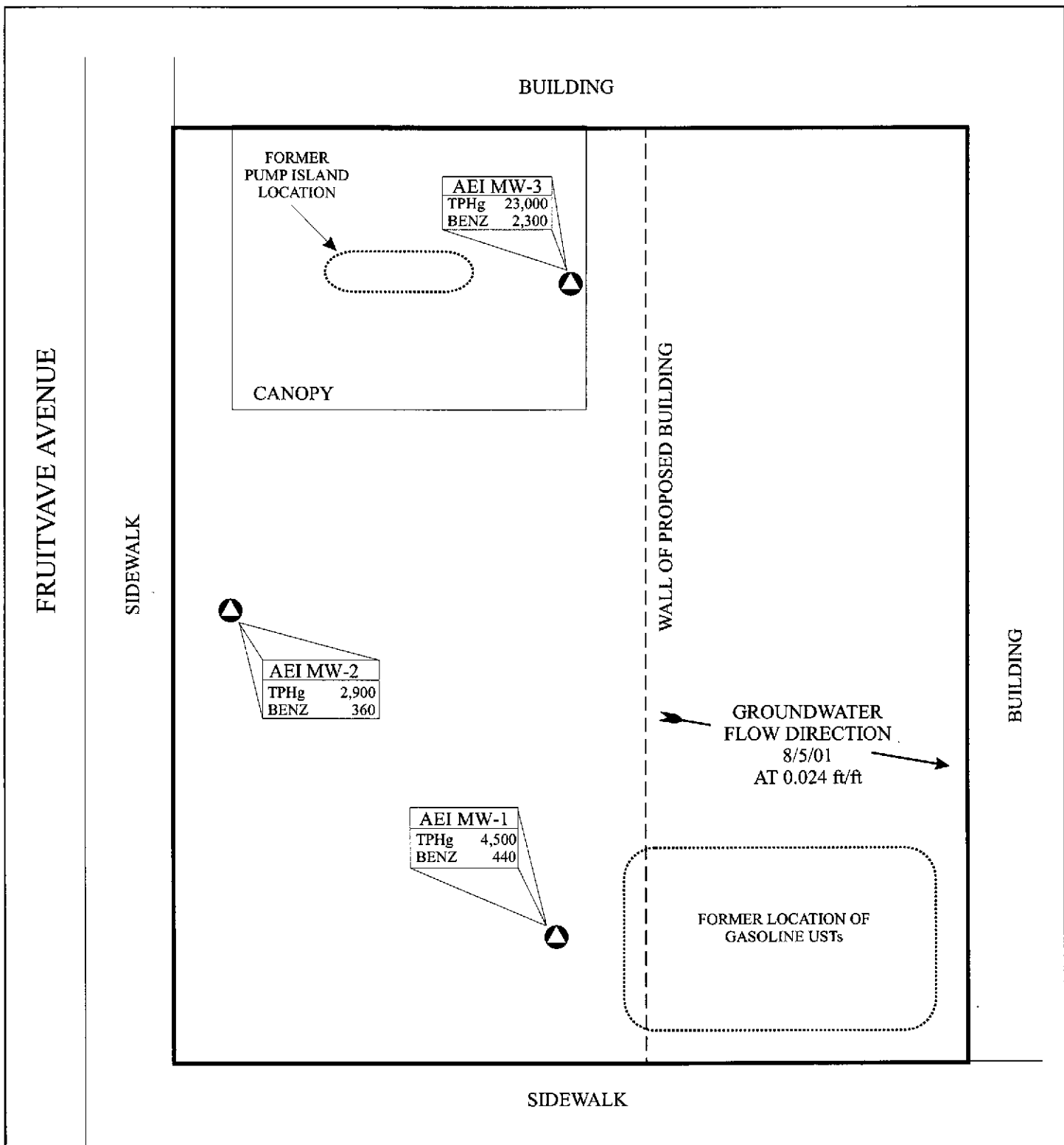


AEI CONSULTANTS

PREVIOUS SOIL BORING LOCATIONS

1450 FRUITVALE AVENUE
OAKLAND, CALIFORNIA

FIGURE 2



KEY

▲ WELL LOCATIONS

TPHg = Total Petroleum Hydrocarbons as gasoline
Benz = Benzene

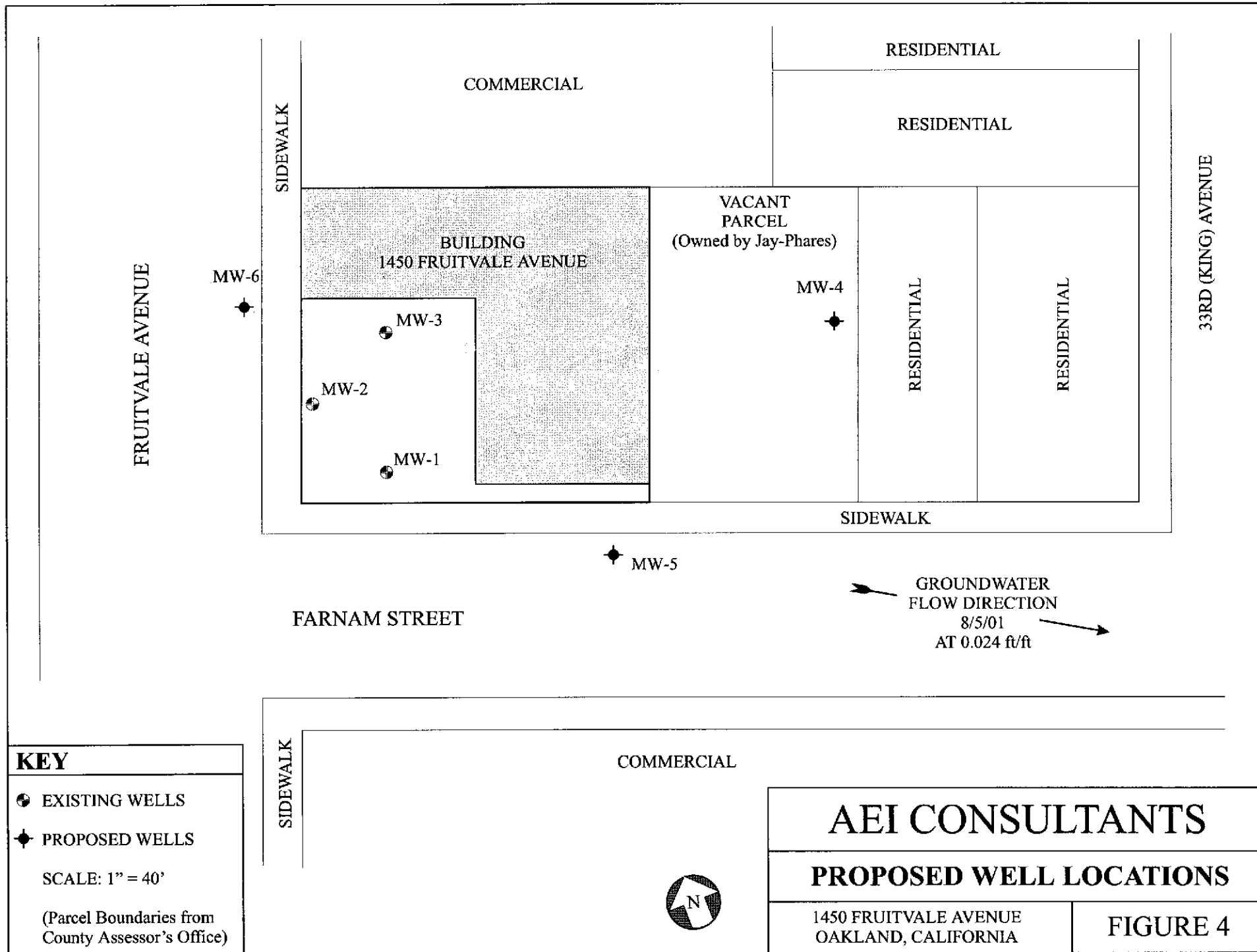
All samples measured in ug/L
(micrograms per Liter)

SCALE: 1" = 10'

AEI CONSULTANTS

EXISTING WELL LOCATIONS

1450 FRUITVALE AVENUE OAKLAND, CALIFORNIA	FIGURE 3
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FRUITVALE AVENUE

SIDEWALK

COMMERCIAL

RESIDENTIAL

RESIDENTIAL

BUILDING
1450 FRUITVALE AVENUE

VACANT
PARCEL
(Owned by Jay-Phares)

RESIDENTIAL

RESIDENTIAL

33RD (KING) AVENUE

MW-6



MW-3



MW-2



MW-1



MW-4

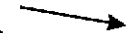


MW-5



FARNAM STREET

GROUNDWATER
FLOW DIRECTION
8/5/01
AT 0.024 ft/ft



SIDEWALK

COMMERCIAL



AEI CONSULTANTS

PROPOSED WELL LOCATIONS

1450 FRUITVALE AVENUE
OAKLAND, CALIFORNIA

FIGURE 4

**Table 1
Water Table Data**

Well ID	Date	Well Elevation (ft msl)	Depth to Water (ft)	Groundwater Elevation (ft msl)
MW-1	10/16/2000	42.13	17.72	24.41
	1/19/2001	42.13	9.15	32.98
	4/26/2001	42.13	9.40	32.73
	8/3/2001	42.13	12.38	29.75
	11/5/2001	42.13	16.22	25.91
MW-2	10/16/2000	42.08	14.98	27.10
	1/19/2001	42.08	9.00	33.08
	4/26/2001	42.08	8.34	33.74
	8/3/2001	42.08	11.70	30.38
	11/5/2001	42.08	15.08	27.00
MW-3	10/16/2000	42.55	17.98	24.57
	1/19/2001	42.55	10.90	31.65
	4/26/2001	42.55	9.21	33.34
	8/3/2001	42.55	12.67	29.88
	11/5/2001	42.55	15.90	26.65

Episode #	Date	Average Water Table (ft msl)	Change from Previous Episode	Flow direction (gradient)
1	10/16/2000	25.36	-	E/SE (0.116)
2	1/19/2001	32.57	+7.21	E/NE (0.041)
3	4/26/2001	33.27	+0.70	SE (0.034)
4	8/3/2001	30.00	-3.27	ESE (0.024)
5	11/5/2001	26.52	-3.48	SE (0.033)

Notes:

All well elevations are measured from the top of the casings
ft msl = feet above mean sea level

Table 2
Groundwater Sample Analytical Data

Well/Sample ID	Date Collected	Consultant/ Lab	TPHg µg/L	MTBE µg/L	Benzene µg/L	Toluene µg/L	Ethylbenzene µg/L	Xylenes µg/L
MW-1	10/16/2000	AEI/MAI	4,500	<20	560	14	53	62
	1/19/2001	AEI/MAI	13,000	<100	790	46	1,100	210
	4/26/2001	AEI/MAI	7,500	<30	470	23	720	120
	8/3/2001	AEI/MAI	4,500	<10	440	11	55	6.6
	11/5/2001	AEI/MAI	1,700	<10	100	6.0	4.6	2.1
MW-2	10/16/2000	AEI/MAI	4,600	<300	380	3.8	95	33
	1/19/2001	AEI/MAI	4,200	<10	450	4.7	120	50
	4/26/2001	AEI/MAI	5,600	<20	810	12	210	65
	8/3/2001	AEI/MAI	2,900	<20	360	3	97	46
	11/5/2001	AEI/MAI	2,400	<85	280	3.2	76	25
MW-3	10/16/2000	AEI/MAI	12,000	<10	570	32	680	1,200
	1/19/2001	AEI/MAI	27,000	<200	3,400	110	2,200	2,700
	4/26/2001	AEI/MAI	33,000	<200	3,300	190	2,800	3,400
	8/3/2001	AEI/MAI	23,000	<50	2,300	52	1,800	1,400
	11/5/2001	AEI/MAI	30,000	<200	1,900	58	2,000	1,600
MRL			50.0	5.0	0.5	0.5	0.5	0.5

MRL = Method Reporting Limit, unless otherwise shown

µg/L = micrograms per liter

AEI = AEI Consultants

MAI = McCampbell Analytical, Inc.

TPHg = total petroleum hydrocarbons as gasoline

MTBE = methyl tertiary butyl ether

Table 3
Previous Soil Sample Analytical Results

Sample ID	Consultant	Sample Date	TPH-g mg/kg	MTBE mg/kg	Benzene mg/kg	Toluene mg/kg	Ethyl Benzene mg/kg	Xylenes mg/kg	Total Lead mg/kg
GP-1 10'	Glenfos	7/9/1998	10	-	<0.005	0.022	0.015	<0.01	-
GP-2 10'	Glenfos	7/9/1998	1.5	-	0.017	<0.005	<0.005	<0.01	-
GP-2 15'	Glenfos	7/9/1998	27	-	0.017	0.056	0.052	0.51	-
GP-2 30'	Glenfos	7/9/1998	2.5	-	<0.005	<0.005	<0.005	<0.01	-
GP-3 10'	Glenfos	7/9/1998	95	-	0.59	0.42	1.1	1.5	7.3
GP-3 15'	Glenfos	7/9/1998	2.5	-	0.055	0.018	0.055	0.26	-
GP-3 20'	Glenfos	7/9/1998	1.6	-	0.02	<0.005	0.02	0.032	-
GP-3 25'	Glenfos	7/9/1998	<1	-	<0.005	<0.005	<0.005	<0.01	-
GP-4 10'	Glenfos	7/9/1998	2.5	-	0.017	<0.005	0.003	0.021	4.1
GP-5 10'	Glenfos	7/9/1998	6.5	-	<0.005	0.022	0.018	0.041	-
GP-5 15'	Glenfos	7/9/1998	19	-	0.077	0.016	0.43	0.49	-
GP-5 20'	Glenfos	7/9/1998	<1	-	<0.005	<0.005	<0.005	<0.01	-
GP-6 5'	Glenfos	7/9/1998	<1	-	<0.005	<0.005	<0.005	<0.01	-
GP-6 10'	Glenfos	7/9/1998	7.7	-	0.008	0.015	0.012	0.047	6.2
GP-6 15'	Glenfos	7/9/1998	190	-	0.34	0.53	2.3	4.7	-
GP-6 20'	Glenfos	7/9/1998	28	-	0.083	0.081	0.052	0.19	-
GP-7 10'	Glenfos	7/9/1998	86	-	<0.005	0.088	0.09	0.5	-
GP-7 15'	Glenfos	7/9/1998	2.7	-	0.008	0.012	<0.005	0.031	-
GP-8 10'	Glenfos	7/9/1998	24	-	0.022	0.061	0.071	0.45	-
GP-8 15'	Glenfos	7/9/1998	5.8	-	0.021	0.014	0.022	0.06	-
GP-8 20'	Glenfos	8/23/1999	<1	-	<0.005	<0.005	<0.005	<0.01	-
AEI-9 10'	AEI	8/23/1999	<1	<0.05	<0.005	<0.005	<0.005	<0.005	-
AEI-9 20'	AEI	8/23/1999	<1	<0.05	<0.005	<0.005	<0.005	<0.005	-
AEI-10 10'	AEI	8/23/1999	77	<0.05	<0.005	<0.005	0.078	<0.005	-
AEI-10 15'	AEI	8/23/1999	69	0.071	0.1	0.21	0.23	<0.005	-
AEI-11 10'	AEI	8/23/1999	<1	<0.05	<0.005	<0.005	<0.005	<0.005	-
AEI-11 15'	AEI	8/23/1999	210	<0.40	<0.020	1.1	1.2	2.4	-
AEI-12 10'	AEI	8/23/1999	24	<0.05	<0.005	0.12	<0.005	<0.005	-
AEI-12 15'	AEI	8/23/1999	120	<0.40	<0.020	<0.020	1.6	1.6	-
MDL			1.0	0.05	0.005	0.005	0.005	0.005	

MDL = Method Detection Limit

mg/kg = milligrams per kilogram (ppm)

- Sample not analyzed for this chemical

TPH-g = Total petroleum hydrocarbons as gasoline

Table 4
Previous Groundwater Sample Analytical Results

Sample ID	Consultant	Sample Date	TPH-g µg/L	MTBE µg/L	Benzene µg/L	Toluene µg/L	Ethyl- Benzene µg/L	Xylenes µg/L	Lead µg/L
GP 1	Glenfos	7/9/1998	170	-	0.53	<0.5	1.2	2.0	-
GP 4	Glenfos	7/9/1998	210	-	<0.5	<0.5	0.58	<1	11
GP 5	Glenfos	7/9/1998	17,000	-	42	24	820	110	-
GP 8	Glenfos	7/9/1998	20,000	<10	1,000	19	420	290	9.5
AEI-9W	AEI	8/23/1999	690	3.8	72	0.79	29	24	-
MDL			50	5.0	0.5	0.5		1.5	2.5

MDL = Method Detection Limit

ND = Not detected above the Method Detection Limit (unless otherwise noted)

µg/L = micrograms per liter (ppb)

- Sample not analyzed for this chemical

TPH-g = Total petroleum hydrocarbons as gasoline

Table 5
Previous Well Installation Soil Analytical Data

Sample ID	TPH-g mg/kg	MTBE mg/kg	Benzene mg/kg	Toluene mg/kg	Ethyl- benzene mg/kg	Xylenes mg/kg
MW-1 6.5'	<1.0	<.05	<.005	<.005	<.005	<.005
MW-1 11.5'	15.0	<.05	<.005	0.31	<.005	0.011
MW-2 6.5'	<1.0	<.05	<.005	<.005	<.005	<.005
MW-2 11'	73.0	<.05	<.005	0.044	0.0080	0.040
MW-3 6.5'	<1.0	<.05	<.005	<.005	<.005	<.005
MW-3 16'	360.0	<1.0	0.42	2.1	6.5	11.0
MRL	1.0	0.05	0.005	0.005	0.005	0.005

MRL = Method Reporting Limit

TPH-g = Total Petroleum Hydrocarbons as gasoline

MTBE = Methyl tertiary butyl ether

mg/kg = milligram per kilogram